U.S. House of Representatives
Committee on Science and Technology
Subcommittee on Research and Science Education

Hearing Charter

The Role of Community Colleges and Industry in Meeting the Demands for Skilled Production Workers and Technicians in the 21st Century Economy

Tuesday, June 19, 2007
3:00 p.m. - 5:00 p.m.
2318 Rayburn House Office Building

Purpose
The purpose of this hearing is to explore the current challenges facing industry in meeting its needs for skilled technicians and production workers in advanced manufacturing and other technology intensive sectors. Witnesses will identify the issues contributing to the problem and address the mechanisms community colleges and industry at large are employing to increase the number of these skilled individuals in the workforce.

Issues
- What are the biggest challenges to attracting more individuals to careers as skilled production workers and technicians? What are community colleges and industry doing to attract more individuals to these careers?
- What are key factors in successful partnerships between tech-training programs and community colleges? How have both community colleges and industry had to adapt to meet each others' needs?
- How are community colleges training students to deal with the fast-paced changes that occur in modern industry? How can industry facilitate this type of learning?

Witnesses
- **Dr. Gerald Pumphrey** is the President of South Puget Sound Community College, Olympia, Washington. He has had extensive experience developing technician training programs for community colleges and engaging industry partnerships in Washington and North Carolina.
- **Dr. Stephan Fonash** is the Director of the Center for Nanotechnology Education and Utilization, Pennsylvania State University's Nano-Technician Advance Technology Education Center. The center, developed in response to industry needs, serves as a regional hub for Pennsylvania community colleges to train students in advanced manufacturing.
- **Mr. Eric Mittelstadt** is the CEO of the National Advisory Council for Advanced Manufacturing (NACFAM), which is an industry-led, non-profit organization that develops and advocates public-policies that foster the growth and development of the U.S. advanced manufacturing sector.
- **Ms. Monica Poindexter** is Associate Director, Corporate Diversity, for Genentech, Inc., a large California based biotechnology company. Ms.

Poindexter has worked with local community colleges to develop training programs for dislocated workers and others to help meet Genetech's needs for technicians and skilled production workers.

Brief Overview

Technology and innovation have kept the American economy strong in the face of increasing competition in the global marketplace. Many reports have stated the critical importance of American science and engineering graduates in helping the country's economy keep pace with this rapid change. The National Academies' 2006 publication, *Rising Above the Gathering Storm,* is one of the most recent and influential of these reports. As industry moves toward producing more high-tech products and employing technology intensive production methods, the need for technologically and scientifically literate individuals at all levels of the workforce will increase. Thus, the need for science, technology, engineering, and mathematics (STEM) training is now as important for the worker running the production process, as it is for the researcher who created that process.

Manufacturing Jobs in the U.S. Economy

The U.S. economy has lost a considerable number of manufacturing jobs. Still, the sector is responsible for 14 percent of the country's GDP and 11 percent of its employment, employing over 14 million workers. Despite cuts in the number of workers, productivity in manufacturing has increased substantially. The key to this productivity has been the adoption of technology by U.S. firms. Increasingly, production in American factories is driven by technology, giving rise to the term advanced manufacturing to describe the activities of today's factories[1]. According to the National Council for Advanced Manufacturing, advanced manufacturing makes extensive use of computer, high precision, and information technologies and a high performance workforce to efficiently produce many different types of "high-tech" or commonplace products.

Many reports find that there are not enough people with the requisite skills to fill the manufacturing jobs that remain. Moreover, just as technology has fundamentally changed the nature of manufacturing, it has also changed or created many other jobs, such as environmental technicians and information technology specialists. Low-skilled jobs, like those that used to exist at many factories, are increasingly rare in manufacturing; technician and production work is now highly specialized and highly skilled. Industry has found it difficult to find enough qualified workers for these jobs. The Manufacturing *in America* report cites the lack of adequately skilled workers for production jobs as an important issue that needs to be addressed to ensure the competitiveness of American manufacturing. In the *2005 Skills Gap Report— A Survey of the American Manufacturing Workforce* the National Association of Manufacturers (NAM) surveyed their members and found that 80 percent of manufacturing companies surveyed reported difficulty in finding enough skilled workers, and 90 percent reported a shortage of skilled production employees. Similar findings are reported by Manpower Inc., a leading company in the employment services industry. Their 2007 *Talent*

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[1] U.S. Department of Commerce, *Manufacturing in America: A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers*, January 2004

Shortage Survey Result, released with a corresponding white paper, found that skilled technician and production jobs ranked as the fourth most difficult positions for U.S. employers to fill and the third most difficult when looked at internationally. Employers today need their technicians and production workers to be technologically literate and have math and problem-solving skills, while also having "soft skills," like communication abilities and a strong work ethic.

Many states have studied their own industry needs and concluded that their workforce is lacking in the requisite skills. This issue is prevalent at the "mid-level" of preparation, referring to those that have post-secondary training, but not a bachelor's degree. In a 2005 study of the needs of New Jersey manufacturers, specialized fields like scientific glassware, chemical processing, and food processing were projected to grow in New Jersey despite an overall decline of manufacturing jobs. The report noted that these industries will need workers who "possess the technical expertise to both understand underlying principles of the production process and interact effectively with advanced machines and computers to control these processes," and it highlighted that the state did not have enough of these people in its workforce[2]. Similar reports noting the shortage of workers for skilled production and technician jobs can be found in Washington[3], Indiana[4], Ohio[5], and Texas[6].

State and local officials realize that the presence of skilled workers in their population is an important factor in the growth and development of industry within their borders. For instance, Arizona's *Two-Year State Workforce Investment Plan: June 2005-June 2007* stresses the importance of a well trained workforce for the development of its economy and places increased training of workers for its high-tech industries as one of the state's priority goals. Furthermore, Maricopa Community College, in Phoenix, commissioned its own study highlighting the importance tech-training has on the development of the regional economy[7]. Georgia is also among the states attempting to use access to tech-training to attract businesses to the state[8].

Community College Programs

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[2] New Jersey State Employment and Training Commission, *Ready for the Job: Understanding Occupational and Skill Demand in New Jersey's Manufacturing Industry, Chemical Processing, Food Processing, Glass Production, and Printing and Publishing,* Spring 2004.

[3] Washington State's Higher Education Coordinating Board, State Board for Community and Technical Colleges, and Workforce Training and Education Coordination Board, *A Skilled and Educated Workforce: An Assessment of the Number and Type of Higher Education and training Credentials Required to Meet Employer Demand*, January 2006.

[4] The Indianapolis Private Industry Council, *Industry Transformation: Growth and Change in Advanced Manufacturing in Central Indiana*, Spring 2006.

[5] Rhodes State College, *Building an Advanced Manufacturing Pathway in West Central Ohio: A Study of Manufacturing Workforce Development Needs*, Fall 2004.

[6] Texas Workforce Commission, *Strategic Plan: Fiscal Years 2007-2011*, 2007.

[7] Battelle's Technology Partnership Practice, Prepared for Maricopa Community College District and the Salt River Project, *Competing with Talent: High-Technology Manufacturing's Future in Greater Phoenix*, December 2005.

[8] http://www.gaworkready.org/Technical_Colleges/aboutTechColleges.html

Community and technical college programs can produce the kind of graduates industry needs to fill these positions. These institutions have long been involved in training technicians for the nation's workforce, but there is now a growing awareness that community colleges can provide industry with the adequately skilled workers it needs. Serving as models for technology training, the National Science Foundation (NSF) Advanced Technology Education (ATE) centers at community colleges develop tech-training programs that prepare students for a wide variety of jobs in high-tech settings. This program funds 33 centers throughout the country that offer both training for local community college students and a research enterprise to develop and disseminate best teaching and curriculum practices for fields such as biotechnology, chemical processing, advanced manufacturing, and information technology. These programs rely on a partnership between the community college and industry, and throughout the country other institutions can look to ATEs as they develop their own training programs.

Feedback from both colleges and industry personnel on their partnerships, in general, and ATEs, specifically, is positive. Employers like and readily hire the graduates of these programs. However, community colleges face many challenges in creating and developing tech-training programs. Perhaps the most vexing is that these programs often face low enrollment. Since community colleges typically incur a much greater expense in capital costs and maintenance for these programs, they can find it difficult to begin or continue a program without a large number of students, especially on their relatively tight operating budgets. Both community college personnel and industry representatives claim that careers in manufacturing are either unknown by or considered undesirable by students and their parents. NAM has recently begun an outreach campaign to high school students to counter their negative perceptions. ATE programs also engage in outreach but it is unclear as to the degree of their success in these endeavors.

An issue very closely related to attracting large numbers of students to the program is the inadequate math and science backgrounds of many students enrolled in community colleges. Community colleges must attract students to these programs, while also taking measures to remediate basic skills, most commonly in math. Another challenge the community college must address is balancing its role as a "feeder" institution for four year programs with its ability to deliver specialized training for industry. Though articulation between tech-training programs and university is not always possible, community college administrators and tech-training faculty are increasingly embracing the need to endow their technology students with problem-solving skills and an ability and willingness to learn so as to enable them to navigate the inevitably changing skill needs of industry.

Highly involved industry partners are a common theme among the most successful tech-training programs. Representatives from both industry and colleges claim that a willingness to devote time and resources to the partnership is crucial for the program to yield the most qualified graduates. Studies like Manpower Inc.'s *2007 Talent Shortage Survey Result* suggest industries partner with educational institution based tech-training programs to address the high need for more qualified workers.

Questions to Witnesses

- **Dr. Pumphrey** was asked to address the following questions:
    - What factors are involved in a decision by a community college when deciding whether to develop or continue a tech-training program in a particular field? How does the college evaluate the potential impact of the program in comparison to its associated costs? What are the biggest challenges faced by a community college in either initiating or continuing a program with low enrollment?
    - What factors influence the low enrollment of tech-training programs? How can low enrollment be remedied? What efforts do your college and others make to attract the widest possible population of students to tech-training?
    - What challenges does inadequate math/science preparation pose to tech-training programs? Do you know of colleges engaged in innovative ways of addressing this dilemma, particularly through collaborating with secondary schools?
    - What is an industry partner's ideal role in a community college tech-training program? Please elaborate on your experiences with industry partners.
    - What impacts do shifts in industry demand have on tech-training programs and how do community colleges address these?

- **Dr. Fonash** was asked to address the following questions:
    - Please describe the evolution of your program-- how it began in response to industry's stated needs and how the program has changed as the industry needs and focuses have changed. Please describe how the program adjusted after the drop-off in demand for semi-conductor manufacturing technicians occurred around the year 2000. How do you prepare your students to be adaptable to the changing needs in high-tech manufacturing?
    - What demographic profile does your program draw? How have you faced the challenge of recruiting more students to your program?
    - How do you determine your math/science curriculum? What steps do your partner community college institutions take to ensure students can meet the demands of your program?
    - What is the ideal role for industry partners in developing and running a successful tech-training program? Please elaborate on industry's role in creating skill standards, developing curriculum, providing student development opportunities, defraying the cost of equipment, and hiring graduates.

- **Mr. Middlestadt** was asked to address the following questions:
    - How have the labor needs of the manufacturing sector changed, and what do the current and near-future opportunities look like for graduates of tech-training programs? Are there technician shortages in advanced

manufacturing and is the problem more concentrated in particular industries?

- What steps, such as increasing wages, benefits, and training, or being more flexible with their hiring qualifications are companies taking to attract more students to careers as skilled technicians and production workers? Also, what are companies individually and collectively doing to raise the perception of manufacturing careers among current students and potential students?
- What influences a company's decision to take an active partnership role in advising a community college tech-prep program? From an industry point of view, what factors foster a successful partnership? To what extent can particular industries prepare training programs for changes in the skills they need?
- One of NACFAM's current focuses is on STEM education. Can you please describe how deficiencies in STEM education affect a company at the technician and production worker level of its workforce?

- **Dr. Steven Juelsgaard** was asked to address the following questions:
  - Please describe how Genentech's partnership with local community colleges began, how it currently operates, and its plans for future directions. What factors contribute to the development and maintenance of a successful program? What challenges did you need to address in developing this program?
  - What is the ideal role for the community college in providing training for your future employees?
  - How does Genentech benefit from hiring community college graduates? How important are well qualified technicians and production workers to your business?
  - What opportunities does Genentech provide to its technicians and skilled production workers to develop new skills as your industry changes?
  - How can community colleges and industry attract more people to careers as technicians and skilled production workers?